NASA Facts

National Aeronautics and
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Discovery/New Frontiers Missions

What other Earth-like planets exist outside our Solar System? What was our own Solar System like 10 million years ago? What's the makeup of the planet Pluto? Those are just some of the questions NASA's Discovery and New Frontiers Programs are venturing to answer. NASA fuels discoveries that make the world smarter, healthier and safer.

The Discovery and New Frontiers Program Office at NASA's Marshall Space Flight Center in Huntsville, Ala., has been tasked to manage these two exciting programs for NASA Headquarters' Science Mission Directorate. The program management includes responsibilities for the project formulation, development, launch, mission operations, and risk assessments.

The Discovery Program includes focused, scientific investigations that complement NASA's larger planetary exploration. Its goal is to launch numerous small missions with a fast development phase—each for considerably less than the cost of larger missions. Of the Discovery Program's 11 missions to date, four are operational (active), three are under development for flight and five have been completed.

Among the active missions is the Mercury Surface Space Environment Geochemistry and Ranging mission, or MESSENGER, launched in August, 2004 to study the planet Mercury.

The spacecraft will orbit the planet Venus twice, once in October 2006 and again in June 2007. It will then fly by Mercury three times beginning in January 2008, before starting a yearlong orbit of that planet in 2011. MESSENGER will provide the first images of the entire planet and collect detailed information on Mercury's makeup. The mission is managed for NASA by the Johns Hopkins University Applied Physics Laboratory in Laurel, Md.

The second active mission is Stardust – the first space mission dedicated solely to studying a comet. Launched in February 1999, the objective is for the spacecraft to experience a close encounter with Comet Wild 2, collect more than a thousand particles of comet dust and snap detailed pictures of the comet's surface. Stardust passed within 149 miles of the center of Comet Wild 2 in January 2004. The samples and photographs collected will be returned to Earth in January 2006. The mission is managed by the Jet Propulsion Laboratory in Pasadena, Calif.

The Deep Impact mission, launched in January 2005, sent a large copper projectile into the path of a comet on July 4, 2005. The resulting intercept bore into the comet, and scientific observation instruments onboard the spacecraft which released the projectile, studied the never-before-seen materials that may hold clues to the structure of a comet. The possibility of extending the Deep Impact's mission to rendezvous with another comet is under review by NASA. The Jet Propulsion Laboratory manages this mission.

ASPERA–3 is another active mission, and is called a Discovery Mission of Opportunity. A Discovery Mission of Opportunity is not a complete Discovery Mission, but rather is just one piece of a larger mission. It gives the U.S. scientific community the chance to participate in non-NASA missions by providing funding for a science instrument, hardware components of a science instrument, or expertise in critical areas of a mission. ASPERA–3 is one of seven scientific instruments aboard the Mars Express spacecraft, a European Space Agency mission that launched from Russia in June 2003 and arrived at Mars six months later. ASPERA–3 is studying the interaction between the solar wind and the atmosphere of Mars and characterizing the plasma and neutral gas environment in the near-Mars space.

A Discovery mission underdevelopment is the Dawn project, which will visit the two oldest asteroids in our Solar System. Set for launch in June 2006, the Dawn spacecraft will reach the asteroid Vesta in 2010 and the asteroid Ceres in 2014. The surfaces of the two asteroids are believed to contain a snapshot of conditions present in the Solar System's first 10 million years. This mission is managed by the Jet Propulsion Laboratory.

Another future Discovery mission—the Kepler mission—is designed to find Earth-sized planets in orbit around other stars outside of our own Solar System. Planned for launch in the summer of 2008, Kepler will monitor 100,000 stars similar to our Sun for four years. The mission is jointly managed by the NASA Ames Research Center and the Jet Propulsion Laboratory.

A third Discovery mission under development is Mission of Opportunity called Moon Mineralogy Mapper (M3). It is an instrument to fly aboard India's Chandrayaan-1 mission. It will characterize and map the mineral composition of the Moon and provide an assessment of lunar resources at high spatial resolution. It is scheduled for launch in September 2007 and has a mission duration of 2 years.

In addition, five Discovery missions have been completed, including the Mars Pathfinder, Near Earth Asteroid Rendezvous (NEAR), Lunar Prospector, Genesis and the Comet Nucleus Tour (CONTOUR).

The first New Frontiers mission, called New Horizons, is scheduled for launch in 2006. It will explore Pluto, its moon Charon and the area just Charon beyond it known as the Kuiper Belt. In a trip that will take almost 10 years, the spacecraft will study the small, icy worlds drifting around the Sun, a billion miles past Neptune, in an effort to better understand the distant reaches of our Solar System. The Johns Hopkins University Applied Physics Laboratory manages the New Horizons mission.

In 2005 a second New Frontiers mission was selected by NASA and is called Juno. It is to explore the planet Jupiter with a highly instrumented spacecraft placed in polar orbit to investigate the existence of an ice-rock core, determine the global water and ammonia abundance in the atmosphere of Jupiter, study convection and deep wind profiles in the atmosphere, investigate the magnetic field and polar magnetosphere. The earliest launch of this mission is expected to be 2010 to 2011.

The Discovery and New Frontiers Program Office was established at the Marshall Center in 2004.

For more information on the Discovery and New Frontiers Program visit:

http://discoverynewfrontiers.nasa.gov/
or
http://www.nasa.gov